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ABSTRACT

This pamphlet is designed to answer many of the questions that have arisen about nuclear power plants and the environment. It is organized into a question and answer format, with the questions taken from those most often asked by the public. Topics include regulation of nuclear power sources, potential dangers to people's health, whether nuclear power is the answer to our power needs, potential alternate power sources and the locations of present nuclear power plants. (CP)

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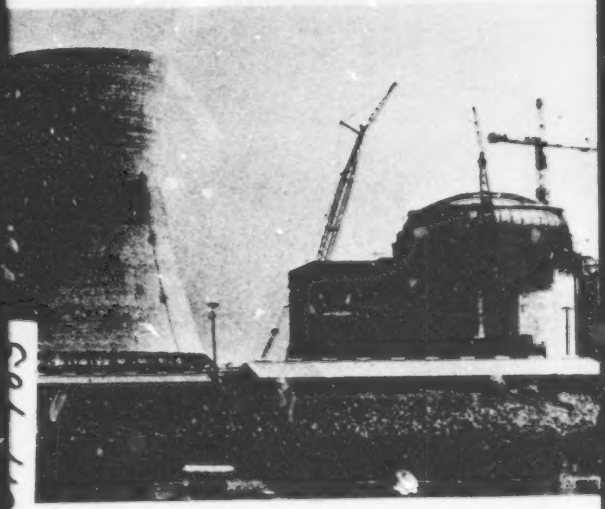
Questions and Answers about NUCLEAR POWER PLANTS



QUESTIONS AND ANSWERS ABOUT NUCLEAR POWER PLANTS

Cover: Large discharges of heated water can upset the ecological systems of a body of water. Such water often must be cooled before it is returned to its source. At the Three-Mile Island Nuclear Station south of Harrisburg, Pennsylvania, water will be cooled in two 372-foot natural draft cooling towers before it is returned to the Susquehanna River. The plant is owned by the Metropolitan Edison Company.

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Revised October 1973

U.S. ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

In 1970, President Nixon told Congress that the Nation's demand for electricity is fast outstripping its generating capacity and that "a sufficient supply of clean energy is essential if we are to sustain healthy economic growth and improve the quality of our national life."

The effort to meet this growing demand by building more electric power plants, however, has created a conflict between the need for dependable electricity without power shortages or brownouts, and concern that such plants threaten health by dumping contaminants into the air and waste heat into bodies of water. Caught in the middle are the electric utilities, which have an economic incentive and a responsibility to provide electrical power without causing unreasonable environmental consequences.

Utilities are turning to nuclear power stations to fill energy needs. While they avoid many of the environmental problems of fossil fuels, nuclear plants bring their own potential hazards that must be controlled.

This pamphlet is designed to answer many of the questions that have arisen about nuclear power plants and the environment.

Extreme caution is exercised in transport of radioactive material. This cylinder of enriched uranium is carefully loaded into a special container before it is trucked to another location.

What kinds of power plants are there?

Two major types of plants generate electricity: (1) fossil-fuel plants that burn gas, oil or coal, and (2) nuclear plants that use uranium as fuel. A third, the hydroelectric power station, uses water power to drive turbines to produce electricity; sites for these are running low. In planning to build a power station, the choice is usually between a fossil-fuel and a nuclear plant.

Do these plants pose a threat to our health and the quality of the environment?

Uncontrolled fossil-fuel plants discharge large quantities of sulfur oxides, smoke and other contaminants into the air. Inhaled over a long period, these contaminants may be a contributing factor to such respiratory diseases as lung cancer, emphysema and asthma. There is evidence also, that low-level radiation exposure over long periods may, in certain cases, cause leukemia and other cancers and possibly genetic damage. However, the risks from the discharge of small amounts of radiation mate-

rials from nuclear power plants into the surrounding air and water are believed to be minimal. Both fossil-fuel and nuclear plants also discharge great quantities of waste heat and require large amounts of water to dissipate the heat. In the cooling process, the heat returned to a body of water may cause a variety of ecological changes on plants and wildlife, some beneficial and others harmful. When the latter occurs, it is called thermal pollution.

Aren't there other methods that can be used to produce electrical power?

Yes. But most are still in research and development stages and cannot be considered as alternative sources for large amounts of power in the immediate future. The President's energy message (April 18, 1973) indicated increased emphasis on developing new sources of energy. Some of the major alternative power sources include:

Coal Gasification and Liquefaction: Natural gas reserves are in rapid decline in this country, but there are still large reserves of coal. Techniques are being developed to convert coal into gas and oil, which unlike much of our coal, can be burned with little pollution.

Stimulation of Natural Gas: Large quantities of natural gas exist in earth formations. The gas currently cannot feasibly be extracted by ordinary techniques. The AEC, under its Plowshare Program, is developing methods for fracturing these earth formations with nuclear explosives to release the gas. An example is the 1973 Rio Blanco test in Colorado.

Conversion of Oil Shale: Large quantities of oil shale exist in our Western regions. Additional work is needed to develop commercially feasible and environmentally satisfactory techniques to mine this shale and extract the oil.

Geothermal Power: It may be possible to use heat from the earth's interior to generate electricity, especially in our Western States. While more development is needed to make this con-

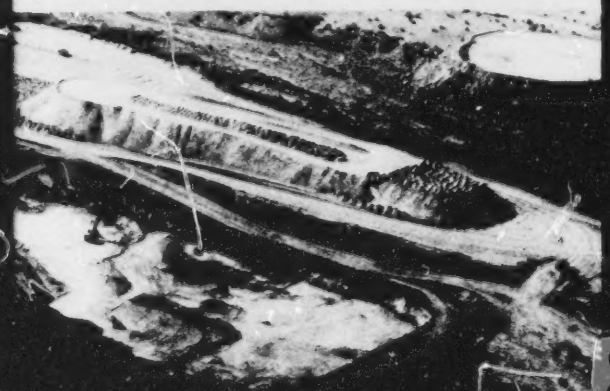
cept feasible, some plants are now in operation throughout the world, including a geothermal plant producing power in an area north of San Francisco.

Solar Energy: Energy from the sun could be used to heat and cool buildings, to produce and convert organic materials to fuels and to generate electricity. The National Science Foundation will administer an increased effort to develop this energy source.

Magnetohydrodynamic (MHD) Power: This is a concept (established in the 1800's by Michael Faraday) for direct conversion of thermal energy to electricity at theoretical efficiencies of 50 percent to 60 percent versus 40 percent for fossil fuel cycles. As such, MHD is not a new source of energy, but is instead, a means of stretching the energy available from remaining fossil fuels.

MHD is based on the principle of generating electricity in a conductor cutting magnetic lines of force (similar to a conventional rotating generator, except the MHD conductor is a fluid instead of a copper wire). One such fluid is a high-temperature gas from burned fossil fuel, which would be seeded with an easily ionized material to increase the elec-

The largest uranium mine in the United States is this open pit operation in Grants, N. M. The ba fuel for nuclear reactors, uranium ore is usually mined over mill capacity and stockpiled until need



trical conductivity of the gas. The hot gas would be passed through magnetic lines of force impressed across the gas flow duct. Electricity induced in the gas would be extracted via electrodes inside the duct walls. The heat left in the gas after passing through the MHD cycle could be used for generation of additional electricity by conventional methods or for industrial heating processes. While small-scale MHD applications have been used in military and space projects, much development is needed to make it practical for large power plant applications.

Nuclear Fusion: This is the thermonuclear fusion of the nuclei of light-weight atoms such as deuterium and tritium with a resulting release of energy. The AEC's program in this area is being increased in the FY '74 budget to accelerate development of thermonuclear fusion reactors. Once developed, this concept will allow utilization of the almost inexhaustible supply of fuel (heavy water) found in the earth's bodies of water. On the other hand, development of the necessary technology, without an unforeseen breakthrough, appears to be considerably into the future.

Fast Breeder Reactor: Commercial demonstration of this concept is planned by 1980 as the next major alternative source of power in the United States. The reactor design to be demonstrated is the Liquid Metal Fast Breeder Reactor. It uses sodium as the reactor coolant, plutonium as the fuel, uranium 238 as the fertile material which concurrently is converted to more plutonium as the reactor is operated. Like the conventional light-water reactors in use today, the fast breeder derives its energy from nuclear fission.

Does the Environmental Protection Agency (EPA) regard nuclear power as the answer to all our blackout and brownout problems?

EPA does not regard nuclear power or any

Uranium's greatest advantage as a fuel is that it stores enormous energy in little space. This one-inch cube contains enough energy to supply a six-room house with electricity and heat for 1,000 years.

other single method of producing electricity as the solution to our present and future energy problems. Rather, the Agency believes in a balanced use of all fuel resources with full consideration of the environmental, as well as the economic, social and other factors. The environmental aspects of energy production extend beyond the power plant itself, whether it be hydroelectric, fossil-fueled or nuclear. In nuclear power, for example, complete evaluation of the environmental aspects ultimately requires assessment of the potential hazards and impact of uranium mining; fabrication of nuclear fuel; operation of the power station; transportation of the radioactive fuel and waste; reprocessing of partially burned-up fuel and the final disposal of radioactive waste.

Why can't we simply slow the consumption rate of electricity?

That is, of course, a possible approach, and it is receiving much attention from the Federal government. The President has called on the Nation to develop an energy conservation ethic, beginning with a voluntary 5 percent reduction in overall energy consumption. But present forecasts relating to energy consumption indicate the demand for power has been steadily rising. The anticipated increase in our population in the next few years should by itself expand the demand for energy, even if per-capita consumption holds steady.

What role does EPA play to determine if nuclear power plants are unsafe and a threat to health and the environment?

Under provisions of the National Environmental Policy Act, EPA examines all proposals of the Atomic Energy Commission (AEC) that involve the siting, construction and operation of nuclear facilities. EPA reviews the required environmental impact statements to determine if adequate protection of human health and the environment from radiation and other factors has been provided. EPA's review of each nuclear power project is publicly available. Currently more than 29 nuclear plants are in operation in the United States. This number is expected to reach more than 80 by 1976 and as many as 200 to 300 by 1985. (For a complete list of reactors—in operation, in construction or planned, see page 15.)

Does EPA have further program responsibilities related to reactor facilities?

Yes. When EPA was formed in 1970, the responsibility for setting generally applicable environmental radiation standards for nuclear operations licensed by the AEC was transferred to EPA from the Commission. In addition, the functions of the former Federal Radiation Council to provide guidance to Federal agencies on all radiation matters were transferred to EPA. Radiation standards, criteria and guidance developed by EPA will be based on scientific data developed by the staff of the Office of Radiation Programs and such expert groups as the National Academy of Science's Advisory Committee on the Biological Effects of Ionizing Radiations which recently published a report entitled, "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation."

EPA also maintains a capability to compile and evaluate environmental radiation surveillance and effluent monitoring data to assess the radiation dose to the population from the nu-

clear power industry. This data is received from the AEC, the operators of nuclear facilities, State agencies, and from EPA's own environmental radiation surveillance networks.

Can nuclear reactor radiation affect our health?

At high exposure levels such as those that followed the World War II bombings of Hiroshima and Nagasaki, Japan, radiation causes serious disease and even death. The long-term effects, however, of low levels of radiation such as the comparatively small emissions from a nuclear power plant are considered too small to detect. Although there is no absolute evidence that adverse health effects are caused by low levels of radiation, EPA assumes that even the smallest amounts of radiation have the potential of causing cancers or other health damage. Over a long term of radiation exposure, there is some probability that a limited number of people may suffer some health damage. EPA, therefore, believes that public benefit from a facility must be greater than any risk imposed on the people or the environment. As noted earlier, fossil-fuel plants also present certain risks to health and the environment.

Is it true that infant deaths tend to rise in nuclear power plant areas?

One scientist's studies with that conclusion have been widely publicized. However, EPA analysis of the methods used in the study indicates that the data do not support the conclusion.

How much radiation comes from nuclear power plants?

The concentration of radioactive materials released to the environment is very low—often so low that it is difficult to detect. Most radiation comes from natural sources—in our foods, in rocks, in the earth, in the air and in the water—an average dose per person of 130

millirems* a year. Little can be done to remove this radiation; it has been around since the world began. Other radiation is man-made; the greatest amount comes from X-ray equipment used in medical and dental diagnosis and therapy. For each person in the United States, this totals an annual average of about 100 millirems.

Other sources of radiation exposure are: fallout from past testing of nuclear weapons in the earth's atmosphere, about five millirems per person per year; radiation from jet flights, radioactive luminous watch dials and color television add about two millirems per year. By contrast, emissions from nuclear power plants and other atomic facilities average an annual exposure of only a fraction of a millirem per person. The average annual exposure to people living within a 50-mile radius of nuclear stations is much less than a millirem.

Who regulates nuclear power plants?

The AEC regulates the amount of radiation permitted to be discharged from a nuclear reactor. EPA has the authority to set environmental radiation standards, to protect the environment and the general public outside the power plant gates. The AEC enforces the standards through its power to license reactor construction and operation.

How does the AEC make sure that utilities are complying with regulations designed to protect the environment?

Monitoring for radioactivity in effluents and in the environment is conducted by the reactor operator and State agencies. Monitoring includes the sampling and analysis of air, water,

*A millirem is one-thousandth of a rem. Rem stands for Roentgen Equivalent Man which is a unit measure of biological damage to man caused by a specific amount of radiation.

milk, soil, fish, and river silts to determine if a power station is adding any radioactivity to the ecosystem. The AEC conducts an independent measurement program at each reactor facility by use of AEC laboratory facilities and contracts with the State agencies.

Does EPA attempt to determine the impact of nuclear facilities on the environment?

Yes. The Agency assigns personnel to study individual facilities in the field. Data on the specific radionuclide content of both gaseous and liquid radioactve effluents and the resulting environmental levels of radiation are helpful in evaluating the environmental impact of proposed nuclear facilities.

What is the safety record of commercial nuclear reactors?

Very good. There have been no radioactive releases that have exceeded the population exposure guides recommended by EPA. The industry has experienced various malfunctions or component failures that caused temporary shutdowns, but in no case has this resulted in significant radiation exposure to the public.

Is it possible to have a serious accident in a reactor?

It is possible. The likelihood of this happening, however, is remote. A nuclear explosion could not happen to any reactor now operating. A serious, but highly unlikely accident would involve the sudden release of comparatively large quantities of radioactive materials from the reactor vessel. Reactor vessels are enclosed in huge concrete and metal containers which, along with many automatic safety features, are designed to prevent leakage. There have been some serious reactor accidents, but these have occurred at research or test reactors and not at operating, licensed, power-producing plants.

You say the nuclear power industry has an excellent safety record. Isn't it true that the safety problem becomes more complicated when larger reactors are built?

It could. The industry's record is based on experience with operating reactors of generating capacity in the range of 200 to 400 megawatts. The new reactors coming on line will have capacities of about a thousand megawatts, and the industry has had little experience with reactors of this size.

Does the heat discharged by reactors into a body of water kill fish and plant life or otherwise upset the balance of nature?

This is possible, but reactor operators are required to meet thermal water discharge standards set by the States and approved by EPA. These limit the temperature range of returned water to minimize the impact of the heat on ecological systems. In cases where the addition of large amounts of heated water would upset the ecological balance, operators are required to cool the water before returning it to its source.

Do nuclear reactors generate radioactive wastes?

Yes, they do. The fission of nuclear fuel in a reactor results in radioactive wastes categorized as low, intermediate or high, according to their degree of radioactivity. A certain amount of low-level waste is usually released into the atmosphere and into some large water source. Technological developments, however, permit recycling nearly all low-level wastes produced. Intermediate-level radioactive wastes are concentrated and then drummed and shipped for burial at various sites around the country. The serious problem of how the very hazardous high-level wastes will be stored, reduced in volume, and finally disposed of, has not been fully resolved.

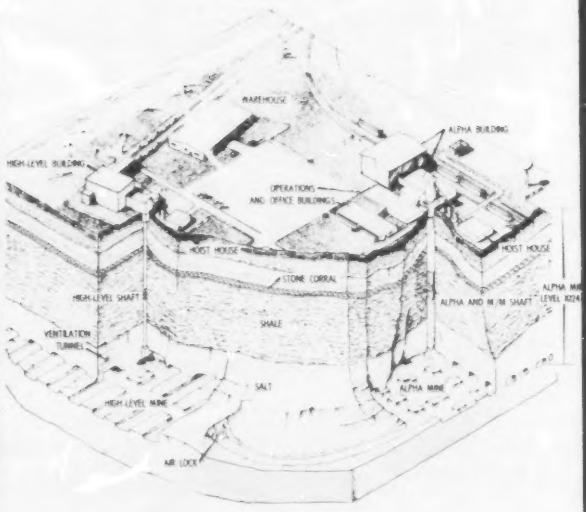
How much high-level radioactive waste is in storage in the United States?

More than 85 million gallons. Nearly all of this waste comes from the production of nuclear weapons and related research. The wastes from these activities are stored mostly in steel-lined tanks at the AEC's Hanford plant in Washington and at its Savannah River plant in South Carolina.

Won't expanded construction of nuclear power reactors further complicate the disposal problem?

Yes. High-level radioactive waste from expanding commercial nuclear power production is expected to grow from a current 600,000 gallons to 4.5 million gallons by 1980; and to about 60 million gallons by the year 2000. Currently the high-level waste from nuclear power production is stored at the Nuclear Fuel Services reprocessing plant near West Valley, N. Y.

Use of salt mines to store high-level radioactive waste is currently being considered. This artist's concept of such a repository shows the extensive work done to insure a safe storage area.



What is being done to protect the public from hazards of radioactive waste disposal?

The AEC and many States require the licensed nuclear materials user to dispose of radioactive wastes safely. So far, the record is excellent. No serious accidents have occurred in shipment or storage. Shipping containers must meet stringent Federal performance regulations. The AEC and the industry routinely inspect storage tanks for leakage, and, in addition, comprehensive surveillance programs ensure that contamination does not enter the environment.

Does the public have an opportunity to voice an opinion on a nuclear reactor proposed in a given area?

By Federal law, no one may build or operate an atomic power plant without first obtaining a construction permit and then an operating license from the AEC. Involved in the licensing procedure is a thorough analysis of the safety of the proposed plant, not only by the AEC's own regulatory staff, but also by expert advisors. Hearings are held for license application in the area where the plant is proposed and the public, along with State and local authorities can attend. Any member of the public with legitimate issues to raise may participate in the proceeding. In addition, the EPA review of the facility along with other agency evaluations become public documents and are available in the AEC's public document room.

Hasn't there been a controversy over the capability of emergency core cooling systems in reactors to prevent an accident?

Yes. The AEC is conducting a lengthy investigation to determine whether the criteria for the design of Emergency Core Cooling Systems (ECCS) in reactors should be modified.

The problem: The ECCS is one of the reactor's key engineered safeguards. Its purpose is to provide water to cool the nuclear fuel in the unlikely event of a loss of normal cooling

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water in the reactor. Should this emergency water system fail in such an event, the heat from the radioactive fuel would melt the reactor. Large quantities of highly radioactive materials would then be released to the containment structure, and from there some could escape into the environment. The AEC investigation was brought about after the small-scale tests and analyses suggested that in certain situations ECCS effectiveness might be inadequate for some plant designs. The AEC has taken steps designed to better assure that the ECCS will provide adequate protection to the health and safety of the public.

SAN ONOFRE NUCLEAR GENERATING STATION

Nuclear Power Plants

Operating, Under Construction or Proposed

ALABAMA

BROWNS FERRY NUCLEAR POWER PLANT, Tennessee Valley Authority, under construction (Unit 1 scheduled for operation in 1973; Unit 2 scheduled for operation in 1974; Unit 3 scheduled for operation in 1974), all boiling water. Decatur, Morgan County.

JOSEPH M. FARLEY NUCLEAR PLANT, Alabama Power Company, under construction (Unit 1 scheduled for operation in 1975; Unit 2 scheduled for operation in 1977), both pressurized water. Dothan, Houston County.

ALABAMA POWER COMPANY, proposed (Unit 1 scheduled for operation in 1981; Unit 2 scheduled for operation in 1982), both boiling water. Selma, Dallas County.

ARKANSAS

ARKANSAS NUCLEAR ONE, Arkansas Power & Light Company (Unit 1 under construction and scheduled for operation in 1973; Unit 2 proposed for operation in 1976), both pressurized water. Russellville, Pope County.

CALIFORNIA

DIABLO CANYON NUCLEAR POWER PLANT, Pacific Gas & Electric Company, under construction (Unit 1 scheduled for operation in 1974; Unit 2 scheduled for operation in 1975), both pressurized water. Diablo Canyon, San Luis Obispo County. Plant is about 12 miles west-southwest of San Luis Obispo.

HUMBOLDT BAY POWER PLANT, Pacific Gas & Electric Company, Unit 3 operating since 1963, boiling water. Eureka, Humboldt County. Plant is about 5 miles south of Eureka.

PACIFIC GAS & ELECTRIC COMPANY, proposed (Unit 1 and Unit 2), both boiling water.

RANCHO SECO NUCLEAR GENERATING STATION, Sacramento Municipal Utility District, under construction (scheduled for operation in 1974), pressurized water. Clay Station, Sacramento County. Plant is about 25 miles southeast of Sacramento.

SAN ONOFRE NUCLEAR GENERATING STATION, Southern California Edison and San Diego Gas & Electric Company, (Unit 1 operating since

1967; Units 2 and 3 schedule indefinite). All pressurized water. San Clemente.

COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION, Public Service Company of Colorado, under construction and scheduled for operation in 1973, high temperature gas cooled. Platteville, Weld County. Plant is about 35 miles north of Denver.

CONNECTICUT

HADDAM NECK PLANT, Connecticut Yankee Atomic Power Company, in operation since 1968, pressurized water, Haddam Neck, Middlesex County. Plant is about 20 miles south-southeast of Hartford.

MILLSTONE NUCLEAR POWER STATION, Millstone Point Company, (Unit 1, boiling water, in operation since 1971. Unit 2, pressurized water, under construction and scheduled for operation in 1974), Waterford, New London County. Plant is about 55 miles southeast of Hartford.

DELAWARE

DELMARVA POWER & LIGHT COMPANY, proposed (Unit 1 scheduled for operation in 1979; Unit 2 scheduled for operation in 1981), both high temperature gas cooled.

FLORIDA

CRYSTAL RIVER PLANT, Florida Power Corporation, Unit 3 under construction and scheduled for operation in 1974, pressurized water. Red Level. Plant is about 70 miles north of Tampa.

ST. LUCIE PLANT, Florida Power & Light Company, (Unit 1, under construction and scheduled for operation 1975; Unit 2 scheduled for operation in 1978), both pressurized water, Fort Pierce, St. Lucie County. Plant is about 50 miles north-northwest of West Palm Beach.

TURKEY POINT STATION, Florida Power & Light Company, under construction (Unit 3 in operation in 1972; Unit 4 scheduled for operation in 1973, both pressurized water, Turkey Point is on the shore of Biscayne Bay, Dade County.

GEORGIA

ALVIN W. VOGTLE NUCLEAR PLANT, Georgia Power Company, (Unit 1 scheduled for operation in 1980; Unit 2 scheduled for operation in 1981), both pressurized water, Waynesboro, Burke County. Plant is about 30 miles south of Augusta.

EDWIN I. HATCH NUCLEAR PLANT, Georgia Power Company. (Unit 1 under construction and scheduled for operation in 1974; Unit 2 planned for operation in 1978), both boiling water, Baxley, Appling County. Plant is about 75 miles west of Savannah.

ILLINOIS

BYRON STATION, Commonwealth Edison Company, proposed (Unit 1 scheduled for operation in 1979; Unit 2 scheduled for operation in 1980), both pressurized water, Byron, Ogle County. Plant is about 12 miles southwest of Rockford.

BRAIDWOOD STATION, Commonwealth Edison Company, proposed (Unit 1 scheduled for operation in 1979; Unit 2 scheduled for operation in 1980), both pressurized water, Braidwood, Will County. Plant is about 40 miles southwest of Chicago.

DRESDEN NUCLEAR POWER STATION, Commonwealth Edison Company. (Unit 1 in operation since 1960; Unit 2 in operation since 1970; Unit 3 in operation in 1971), all boiling water, Morris, Grundy County. Plant is about 35 miles southwest of Chicago.

LASALLE COUNTY NUCLEAR STATION, Commonwealth Edison Company, proposed (Unit 1 scheduled for operation in 1977; Unit 2 scheduled for operation in 1978), both boiling water, Seneca, LaSalle County. Plant is about 60 miles southwest of Chicago.

QUAD-CITIES STATION, Commonwealth Edison Company and Iowa-Illinois Gas & Electric Company. (Unit 1 in operation in 1972; Unit 2 in operation in 1972), both boiling water, Cordova, Rock Island County. Plant is about 20 miles northeast of Davenport, Iowa.

ZION STATION, Commonwealth Edison Company, Unit 1 and Unit 2 scheduled, both pressurized water, Zion, Lake County. Plant is about 40 miles north of Chicago.

INDIANA

BAILLY GENERATING STATION, Northern Indiana Public Service Company, proposed for operation in 1977, boiling water, Dune Acres, Porter County. Plant is about 10 miles east of Gary.

IOWA

DUANE ARNOLD ENERGY CENTER, Iowa Electric Light & Power Company, Central Iowa Power Cooperative and Corn Belt Power Cooperative, under construction (Unit 1 scheduled for operation in 1974), boiling water, Palo, Linn County. Plant is about 10 miles northwest of Cedar Rapids.

LOUISIANA

RIVER BEND STATION, Gulf States Utilities Company, proposed, scheduled for operation in 1979, boiling water, St. Francisville, Feliciana Parish. Plant is about 25 miles north of Baton Rouge.

WATERFORD GENERATING STATION, Louisiana Power & Light Company, proposed (Unit 3 scheduled for operation in 1976), pressurized water, Taft, St. Charles Parish. Plant is about 20 miles west of New Orleans.

MAINE

MAINE YANKEE ATOMIC POWER PLANT, Maine Yankee Atomic Power Corporation, in operation in 1972, pressurized water, Wiscasset, Lincoln County. Plant is about 45 miles northeast of Portland.

MARYLAND

CALVERT CLIFFS NUCLEAR POWER PLANT, Baltimore Gas & Electric Company, under construction (Unit 1 scheduled for operation in 1974; Unit 2 scheduled for operation in 1975), both pressurized water, Lusby, Calvert County. Plant is about 45 miles southeast of Washington, D.C.

DOUGLAS POINT PROJECT, Potomac Electric Power Company, proposed (Unit 1 scheduled for operation in 1980; Unit 2 scheduled for operation in 1981), both boiling water, Douglas Point.

MASSACHUSETTS

PILGRIM STATION, Boston Edison Company, under construction (Unit 1, boiling water, in operation in 1972; Unit 2, pressurized water, scheduled for operation in 1978), Plymouth, Plymouth County. Plant is about 35 miles southeast of Boston.

YANKEE NUCLEAR POWER STATION, Yankee Atomic Electric Company, in operation since 1961, pressurized water, Rowe, Franklin County. Plant is about 30 miles northeast of Pittsfield.

MICHIGAN

BIG ROCK POINT NUCLEAR PLANT, Consumers Power Company of Michigan, in operation since 1965, boiling water, Big Rock Point, Charlevoix County. Plant is about 45 miles north-northeast of Traverse City.

GREENWOOD ENERGY CENTER, Detroit Edison Company, proposed (Unit 2 scheduled for operation in 1980; Unit 3 scheduled for operation in 1981), both pressurized water, St. Clair County.

MIDLAND NUCLEAR POWER PLANT, Consumers Power Company of Michigan, proposed (Unit 1 scheduled for operation in 1979; Unit 2 scheduled for operation in 1980). Both pressurized water, Midland, Midland County. Plant is about 30 miles northwest of Flint.

PALISADES NUCLEAR POWER STATION, Consumers Power Company of Michigan, Unit 1 in operation in 1971, pressurized water, South Haven, Van Buren County. Plant is about 55 miles west of Battle Creek.

DONALD C. COOK PLANT, Indiana & Michigan Electric Company, under construction (Unit 1 scheduled for operation in 1974; Unit 2 schedule indefinite), both pressurized water, Bridgman, Berrien County. Plant is about 25 miles northwest of South Bend, Ind.

ENRICO FERMI ATOMIC POWER PLANT, Detroit Edison Company, (Unit 2, under construction, boiling water, scheduled for operation in 1977; Unit 3 scheduled for operation in 1979). Lagoona Beach, Monroe County. Plant is about 30 miles southwest of Detroit.

QUANICASSEE NUCLEAR STATION, Consumers Power Company, proposed (Unit 1 scheduled for operation in 1981; Unit 2 scheduled for operation in 1982), both pressurized water. Bay City, Bay County.

MINNESOTA

MONTICELLO NUCLEAR GENERATING PLANT, Northern States Power Company, in operation in 1971, boiling water, Monticello, Wright County. Plant is about 30 miles northwest of Minneapolis.

PRAIRIE ISLAND NUCLEAR GENERATING PLANT, Northern States Power Company, under construction (Unit 1 scheduled for operation in 1973; Unit 2 scheduled for operation in 1974), both pressurized water, Red Wing, Goodhue County. Plant is about 45 miles southeast of Twin Cities.

MISSISSIPPI

GRAND GULF NUCLEAR STATION, Mississippi Power & Light Company, proposed, scheduled for operation in 1979, boiling water. Port Gibson, Claiborne County. Plant is about 60 miles southwest of Jackson.

NEBRASKA

COOPER NUCLEAR STATION, Nebraska Public Power District, under construction, scheduled for

operation in 1973, boiling water, Brownville, Nemaha County. Plant is about 60 miles east-southeast of Lincoln.

FORT CALHOUN STATION, Omaha Public Power District, under construction (Unit 1 scheduled for operation in 1973), pressurized water, Fort Calhoun, Washington County. Plant is about 10 miles north of Omaha.

NEW HAMPSHIRE

SEABROOK NUCLEAR STATION, Public Service Company of New Hampshire, proposed (Unit 1 is scheduled for operation in 1979; Unit 2 scheduled for operation in 1981), both pressurized water, Seabrook, Rockingham County. Plant is about 15 miles south of Portsmouth.

NEW JERSEY

ATLANTIC OFFSHORE, Public Service Electric & Gas Company, Jersey Central Power & Light Company and Atlantic City Electric Company, proposed (Unit 1 scheduled for operation in 1980; Unit 2 scheduled for operation in 1981), both pressurized water, Little Egg Inlet. Plant is about 15 miles northeast of Atlantic City.

FORKED RIVER GENERATING STATION, Jersey Central Power & Light Company, under construction (Unit 1 scheduled for operation in 1978), pressurized water, Forked River, Ocean County. Plant is about 50 miles south of Newark.

OYSTER CREEK NUCLEAR POWER PLANT, Jersey Central Power & Light Company, (Unit 1 in operation since 1969), boiling water, Toms River, Ocean County. Plant is about 50 miles south of Newark.

NEWBOLD ISLAND NUCLEAR GENERATING STATION, Public Service Electric & Gas Company, proposed (Unit 1 scheduled for operation in 1979; Unit 2 scheduled for operation in 1980), both boiling water, Bordentown, Burlington County. Plant is about 5 miles south of Trenton.

SALEM NUCLEAR GENERATING STATION, Public Service Electric & Gas, Philadelphia Electric Company, Atlantic City Electric Company and Delmarva Power & Light Company, under construction (Unit 1 scheduled for operation in 1975; Unit 2 scheduled for operation in 1975), both pressurized water, Salem, Salem County. Plant is about 20 miles south of Wilmington, Del.

NEW YORK

INDIAN POINT STATION, Consolidated Edison

Company, (Unit 1 in operation since 1962; Unit 2 under construction and scheduled for operation in 1973; Unit 3 under construction and scheduled for operation in 1974), all pressurized water, Indian Point, Westchester County. Plant is about 25 miles north of New York City.

JAMES A. FITZPATRICK NUCLEAR PLANT, Power Authority of State of New York, under construction, scheduled for operation in 1973, boiling water, Scriba, Oswego County.

NINE MILE POINT NUCLEAR STATION, Niagara Mohawk Power Corporation, (Unit 1 in operation since 1969; Unit 2 planned for operation in 1978), both boiling water, Scriba, Oswego County.

ROBERT EMMETT GINNA NUCLEAR POWER PLANT, Rochester Electric & Gas Company, (Unit 1 in operation since 1970), pressurized water, Ontario, Wayne County. Plant is about 15 miles east of Rochester.

SHOREHAM NUCLEAR POWER STATION, Long Island Lighting Company, scheduled for operation in 1977, boiling water, Brookhaven, Suffolk County. Plant is about 50 miles east-northeast of New York City.

NORTH CAROLINA

BRUNSWICK STEAM ELECTRIC PLANT, Carolina Power & Light Company, under construction (Unit 2 scheduled for operation in 1974; Unit 1 scheduled for operation in 1975), both boiling water, Southport, Brunswick County. Plant is about 20 miles south of Wilmington.

SHEARON HARRIS STATION, Carolina Power & Light Company, proposed (Unit 1 scheduled for operation in 1977; Unit 2 scheduled for operation in 1978; Unit 3 scheduled for operation in 1979; Unit 4 scheduled for operation in 1980), all pressurized water, Bonsal, Wake County. Plant is about 20 miles southwest of Raleigh.

WILLIAM B. McGUIRE NUCLEAR STATION, Duke Power Company, proposed (Unit 1 scheduled for operation in 1976, Unit 2 scheduled for operation in 1977), both pressurized water, Cowans Ford Dam, Mecklenburg County. Plant is about 17 miles north-northwest of Charlotte.

OHIO

DAVIS-BESSE NUCLEAR POWER STATION, Toledo Edison-Cleveland Electric Illuminating Company, scheduled for operation in 1975, pressurized water, Oak Harbor, Ottawa County. Plant is about 20 miles southeast of Toledo.

PERRY NUCLEAR POWER PLANT, Cleveland Electric Illuminating Company, proposed (Unit 1 scheduled for operation in 1979; Unit 2 scheduled for operation in 1980), both boiling water, Perry, Lake County. Plant is about 20 miles northeast of Cleveland.

WILLIAM H. ZIMMER NUCLEAR POWER STATION, Cincinnati Gas & Electric Company, under construction (Unit 1 scheduled for operation in 1977), boiling water, Moscow, Clermont County. Plant is about 25 miles southeast of Cincinnati.

OREGON

TROJAN STATION, Portland General Electric Company, Eugene Water and Electric Board, and Pacific Power & Light Company, under construction, scheduled for operation in 1975, pressurized water, Rainier, Columbia County. Plant is about 40 miles north-northwest of Portland.

PENNSYLVANIA

BEAVER VALLEY POWER STATION, Duquesne Light Company, Ohio Edison Company, Pennsylvania Power Company, under construction (Unit 1 scheduled for operation in 1974; Unit 2 scheduled for operation in 1978), pressurized water, Midland, Beaver County. Plant is about 20 miles northwest of Pittsburgh.

SHIPPINGPORT ATOMIC POWER STATION, Duquesne Light Company and AEC, (Unit 1 in operation since 1957), pressurized water, Shippingport, Beaver County. Plant is about 20 miles northwest of Pittsburgh.

THREE-MILE ISLAND NUCLEAR STATION, Metropolitan Edison Company, under construction (Unit 1 scheduled for operation in 1974; Unit 2, Jersey Central Power & Light Company, scheduled for operation in 1976), both pressurized water, Middletown, Dauphin County. Plant is about 10 miles southeast of Harrisburg.

LIMERICK GENERATING STATION, Philadelphia Electric Company, proposed (Unit 1 scheduled for operation in 1978; Unit 2 scheduled for operation in 1979), both boiling water, Pottstown, Montgomery County. Plant is about 20 miles southeast of Philadelphia.

PEACH BOTTOM ATOMIC POWER STATION, Philadelphia Electric Company, Public Service Electric and Gas Company, Atlantic City Electric Company and Delmarva Power & Light Company, (Unit 1, gas cooled, graphite moderated, in operation since 1967; Unit 2, boiling water, under construction and scheduled for operation in 1973; Unit 3, boiling

water, under construction and scheduled for operation in 1974), Peach Bottom, York County. Plant is about 40 miles northeast of Baltimore.

PHILADELPHIA ELECTRIC COMPANY, proposed (Unit 1 scheduled for operation in 1981; Unit 2 scheduled for operation in 1983), both high temperature gas-cooled.

SUSQUEHANNA STEAM ELECTRIC STATION, Pennsylvania Power & Light, proposed (Unit 1 scheduled for operation in 1979; Unit 2 scheduled for operation in 1981), both boiling water, Beach Haven, Lucerne County. Plant is about 30 miles southwest of Scranton.

SOUTH CAROLINA

CATAWBA NUCLEAR STATION, Duke Power Company, proposed (Unit 1 scheduled for operation in 1979; Unit 2 scheduled for operation in 1980), both pressurized water, Lake Wylie, York County.

H. B. ROBINSON S.E. PLANT, Carolina Power & Light Company, (Unit 2 in operation in 1971), pressurized water, Hartsville, Darlington County. Plant is about 65 miles southeast of Charlotte.

OCONEE NUCLEAR STATION, Duke Power Company, under construction (Unit 1 scheduled for operation in 1973; Unit 2 and Unit 3 indefinite), all pressurized water, Seneca, Oconee County. Plant is about 25 miles west of Greenville.

PEACH BOTTOM ATOMIC POWER STATION

VIRGIL C. SUMMER NUCLEAR STATION, South Carolina Electric & Gas Company, (Unit 1 scheduled for operation in 1977), pressurized water, Parr, Fairfield County. Plant is about 26 miles northwest of Columbia.

TENNESSEE

LMFBR DEMONSTRATION PLANT, proposed, scheduled for operation in 1980, sodium-cooled fast breeder, Oak Ridge, Anderson County.

TENNESSEE VALLEY AUTHORITY, proposed (Units 1 and 3 scheduled for operation in 1980; Units 2 and 4 scheduled for operation in 1981), all boiling water.

SEQUOYAH NUCLEAR POWER PLANT, Tennessee Valley Authority, under construction (Unit 1 scheduled for operation in 1975; Unit 2 scheduled for operation in 1975), both pressurized water, Daisy, Hamilton County. Plant is about 10 miles northeast of Chattanooga.

WATTS BAR NUCLEAR PLANT, Tennessee Valley Authority, proposed (Unit 1 scheduled for operation in 1977; Unit 2 scheduled for operation in 1978), both pressurized water, Spring City, Rhea County. Plant is about 50 miles northeast of Chattanooga.

TEXAS

COMANCHE PEAK STEAM ELECTRIC STATION, Texas Power & Light Company & TESC and DP & LC, proposed (Unit 1 scheduled for operation in 1980; Unit 2 scheduled for operation in 1982), Glen Rose.

VERMONT

VERMONT YANKEE GENERATING STATION, Vermont Yankee Nuclear Power Corporation, in operation in 1972, boiling water, Vernon, Windham County. Plant is about 15 miles southwest of Keene, N. H.

VIRGINIA

NORTH ANNA POWER STATION, Virginia Electric and Power Company, under construction (Unit 1 scheduled for operation in 1974; Unit 2 scheduled for operation in 1975, Unit 3 scheduled for operation in 1977; Unit 4 scheduled for operation in 1978), all pressurized water, Mineral, Louisa County. Plant is about 50 miles northwest of Richmond.

SURRY POWER STATION, Virginia Electric & Power Company, under construction (Unit 1 started up in 1972; Unit 2 scheduled for operation in 1973),

both pressurized water, Gravel Neck Surry County. Plant is about 45 miles southeast of Richmond.

VEPCO/B & W, Virginia Electric & Power Company, proposed (Unit 1 scheduled for operation in 1980; Unit 2 scheduled for operation in 1981), both pressurized water.

WASHINGTON

WPPSS NUCLEAR PROJECT, Washington Public Power Supply System, proposed (Unit 1, pressurized water, scheduled in 1980; Unit 2, boiling water, scheduled for 1977), Richland.

N REACTOR/WPPSS, AEC and Washington Public Power Supply System. In operation since 1966, graphite, Richland.

WISCONSIN

GENOA NUCLEAR GENERATING STATION, Dairyland Power Cooperative and AEC, in operation since 1971, boiling water, Genoa, Vernon County. Plant is about 20 miles south of La Crosse.

KEWAUNEE NUCLEAR POWER PLANT, Wisconsin Group, under construction (Unit 1 scheduled for operation in 1973), pressurized water, Carlton, Kewaunee County. Plant is about 5 miles east-southeast of Green Bay.

POINT BEACH NUCLEAR PLANT, Wisconsin Electric Power Company and Wisconsin-Michigan Power Company, (Unit 1 in operation since 1970; Unit 2 in operation in 1972), both pressurized water, Two Creeks, Manitowoc County. Plant is about 25 miles southeast of Green Bay.

Information taken from
"Nuclear Reactors, Built, Being Built, or Planned,"
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